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10/032,357	12/21/2001	Stefan Uhlenbrock	150.0111 0101	4965
26813	7590	01/04/2005	EXAMINER	
MUETING, RAASCH & GEBHARDT, P.A. P.O. BOX 581415 MINNEAPOLIS, MN 55458			GUERRERO, MARIA F	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 01/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/032,357

Applicant(s)

UHLENBROCK ET AL. (SM)

Examiner

Maria Guerrero

Art Unit

2822

- The MAILING DATE of this communication appears on the cover sheet with the correspondence address -

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2004.
- 2a) ☒ This action is FINAL.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2-7, 9, 10, 12-22, 24-26 and 30-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-7, 9, 10, 12-22, 24-26 and 30-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

Art Unit: 2822

### **DETAILED ACTION**

1. This Office Action is in response to the Amendment filed May 10, 2004 and the Election filed October 20, 2004. The Restriction Requirement mailed June 14, 2004 has been withdrawn.

### **Status of Claims**

2. Claims 1, 8, 11, 23, 27-29 are canceled. Claims 2-7, 9-10, 12-22, 24-26, 30-43 are pending.

### ***Information Disclosure Statement***

3. The information disclosure statement (IDS)(s) submitted on May 10, 2004, July 27, 2004, and September 13, 2004 have been considered.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2-7, 9-10, 12-22, 24-26, and 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beitel et al. (U.S. 2002/0017063 A1) in view of Russell et al. (U.S. 6,395,194).

Beitel et al. teaches positioning a Group VIII metal –containing surface of a semiconductor substrate to interface with a polishing surface (Abstract, page 2, paragraph 0019; paragraph 0024). Beitel et al. discloses the Group VIII metal being rhodium, ruthenium, iridium, osmium, palladium, and platinum (page 2, paragraph 0019). Furthermore, Beitel et al. teaches supplying an acidic planarization composition in proximity to the interface and planarizing the Group VIII metal –containing surface (Fig. 5-6, page 4, paragraph 0050-0064, paragraph 0020). Beitel et al. discloses the planarization composition comprising oxygen, ozone or chlorine (oxidizing gas) (page 2, paragraph 0020; page 3, paragraph 0036).

In addition, Beitel et al. teaches providing a silicon substrate having a patterned dielectric layer formed thereon and a Group VIII metal–containing layer formed over the patterned dielectric layer and applying the planarization method to a capacitor or barrier layer in one step (Fig. 1-6, page 3, paragraph 0028-0034, 0037-0041; page 4, paragraph 0046-0049).

Beitel et al. does not specifically show the polishing surface comprising a polishing pad and the planarization composition having a hardness of no greater than 9 Mohs. However, Russell et al. teaches positioning a Group VIII metal–containing surface of a substrate to interface with a polishing surface (polishing pad)(Abstract). Russell et al. discloses the Group VIII metal being iridium, platinum, palladium, ruthenium or alloy thereof (col. 3, lines 30-39, 54-57). Russell et al. teaches supplying an acidic planarization composition in proximity to the interface and planarizing the Group VIII metal–containing surface (col. 4, lines 7-35, col. 5, lines 20-60). Russell et al. teaches

Art Unit: 2822

using a plurality of abrasive particles ( $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$ ,  $\text{CeO}_2$ ) having a hardness of no greater than about 9 Mohs (col. 5, lines 1-10).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Beitel et al. reference by specifying the polishing pad and the hardness taught by Russell et al. in order to enhance the removal rate without damaging the surface (Russell et al., col. 4, lines 48-60).

5. Claims 30-31 and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beitel et al. (U.S. 2002/0017063 A1) in view of Weast et al. "CRC Handbook of Chemistry and Physics".

Beitel et al. teaches positioning a Group VIII metal –containing surface of a semiconductor substrate to interface with a polishing surface (Abstract, page 2, paragraph 0019; paragraph 0024). Beitel et al. discloses the Group VIII metal being rhodium, ruthenium, iridium, osmium, palladium, and platinum (page 2, paragraph 0019). Furthermore, Beitel et al. teaches supplying an acidic planarization composition in proximity to the interface and planarizing the Group VIII metal –containing surface (Fig. 5-6, page 4, paragraph 0050-0064, paragraph 0020). Beitel et al. discloses the planarization composition comprising oxygen, ozone or chlorine (oxidizing gas) (page 2, paragraph 0020; page 3, paragraph 0036).

In addition, Beitel et al. teaches providing a silicon substrate having a patterned dielectric layer formed thereon and a Group VIII metal–containing layer formed over the patterned dielectric layer and applying the planarization method to a capacitor or barrier

Art Unit: 2822

layer in one step (Fig. 1-6, page 3, paragraph 0028-0034, 0037-0041; page 4, paragraph 0046-0049).

Beitel et al. is silent about adding the oxidizing agent in the form of a gas. However, a person of ordinary skill in the art would infer this recitation because Beitel et al. shows adding oxygen, ozone or chlorine and those compounds are well known as being in the form of a gas.

Beitel et al. does not specifically show the oxidizing gas having a standard reduction potential of at least about 1.4 versus a standard hydrogen electrode at 25°C. However, Beitel et al. discloses reducing the normal potential  $E_0$  of the precious metal. In addition, Weast et al. is cited as evidenced to show that the standard reduction potential is a well-known characteristic of each material (D-151 to D-154).

Regarding the specific variables claimed, "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Beitel et al. reference by specifying the standard reduction potential of the oxidizing gas being at least about 1.4 using the information provided by Weast et al. The modification is proper because the oxidizing gas (e.g.  $\text{Cl}_2$ ) disclosed by Beitel et al. has a reduction potential at least about 1.4 (Beitel et al., page 2, paragraph 0020, 0023; Weast et al., Table 1).

Art Unit: 2822

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable Beitel et al. (U.S. 2002/0017063 A1) and Russel et al. (U.S. 6,395,194) as applied to claims 2-7, 9-10, 12-22, 24-26, and 38-40 above, and further in view of Bruxvoort et al. (U.S. 5,958,794).

Regarding claim 14, Small et al. does not specifically show using a fixed abrasive article. However, Bruxvoort et al. teaches the use of the fixed abrasive article as conventional in the art (col. 3, lines 35-50, col. 10, lines 17-20).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Small et al. and Weast et al. by including the use of the fixed abrasive article as taught by Bruxvoort et al. in order to reduce cost (Bruxvoort et al., col. 4, lines 33-35).

7. Claims 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beitel et al. (U.S. 2002/0017063 A1) in view of Bruxvoort et al. (U.S. 5,958,794):

Beitel et al. teaches positioning a Group VIII metal –containing surface of a semiconductor substrate to interface with a polishing surface (Abstract, page 2, paragraph 0019; paragraph 0024). Beitel et al. discloses the Group VIII metal being rhodium, ruthenium, iridium, osmium, palladium, and platinum (page 2, paragraph 0019). Furthermore, Beitel et al. teaches supplying an acidic planarization composition in proximity to the interface and planarizing the Group VIII metal –containing surface (Fig. 5-6, page 4, paragraph 0050-0064, paragraph 0020). Beitel et al. discloses the planarization composition comprising oxygen, ozone or chlorine (oxidizing gas) (page 2, paragraph 0020; page 3, paragraph 0036).

In addition, Beitel et al. teaches providing a silicon substrate having a patterned dielectric layer formed thereon and a Group VIII metal-containing layer formed over the patterned dielectric layer and applying the planarization method to a capacitor or barrier layer in one step (Fig. 1-6, page 3, paragraph 0028-0034, 0037-0041; page 4, paragraph 0046-0049).

Beitel et al. is silent about adding the oxidizing agent in the form of a gas. However, a person of ordinary skill in the art would infer this recitation because Beitel et al. shows adding oxygen, ozone or chlorine and those compounds are well known as being in the form of a gas.

Regarding claims 41-43, Beitel et al. does not specifically show using a fixed abrasive article. However, Bruxvoort et al. teaches the use of the fixed abrasive article as conventional in the art (col. 3, lines 35-50, col. 10, lines 17-20).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Beitel et al. reference by including the use of the fixed abrasive article as taught by Bruxvoort et al. in order to reduce cost (Bruxvoort et al., col. 4, lines 33-35).

8. Claims 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Small et al. (U.S. 2002/0111026 A1) in view of Weast et al. "CRC Handbook of Chemistry and Physics" and Bruxvoort et al. (U.S. 5,958,794).

Small et al. teaches positioning a Group VIII metal -containing surface of a semiconductor substrate to interface with a polishing surface (Abstract, page 1,



Art Unit: 2822

paragraph 0006). Small et al. discloses the Group VIII metal being ruthenium, iridium, or platinum (page 1, paragraph 0006, page 4, paragraph 0038-0039). Furthermore, Small et al. teaches supplying an acidic planarization composition in proximity to the interface and planarizing the Group VIII metal –containing surface (page 4, paragraph 0036-0039). Small et al. discloses feeding an oxidizing gas (ozone) to the planarization composition (page 1, paragraph 0006,0008-0010; page 2, paragraph 0013, 0020). Small et al. also shows employing a polishing pad (page 2, paragraph 0024, page 3, paragraph 0033). Small et al. discloses employing abrasive particles (silica, alumina, and ceria) (col. 3, paragraph 0028)

Small et al. does not specifically show the oxidizing gas having a standard reduction potential of at least about 1.4 versus a standard hydrogen electrode at 25°C. However, Weast et al. is cited as evidenced to show that the standard reduction potential is a well-known characteristic of each material (D-151 to D-154).

Regarding the specific variables claimed, “where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Small et al. does not specifically show using a fixed abrasive article. However, Bruxvoort et al. teaches the use of the fixed abrasive article as conventional in the art (col. 3, lines 35-50, col. 10, lines 17-20).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Small et al. reference by specifying the standard

Art Unit: 2822

reduction potential of the oxidizing gas being at least about 1.4 using the information provided by Weast et al. The modification is proper because the oxidizing gas (e.g. ozone) disclosed by Small et al. has a reduction potential at least about 1.4 (Weast et al., Table 1).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Small et al. and Weast et al. by including the use of the fixed abrasive article as taught by Bruxvoort et al. in order to reduce cost (Bruxvoort et al., col. 4, lines 33-35).

### ***Response to Arguments***

9. Applicant's arguments with respect to claims 2-7, 9-10, 12-22, 24-26, and 30-43 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Webster's II, New Riverside University Dictionary (of record) is cited as evidence to show that a person of ordinary skill in the art would infer that Russel et al. (U.S. 6,395,194) and Beitel et al. (U.S. 2002/0017063 A1) disclosed the claimed oxidizing gas (Webster's II, pages 258, 842). Sanhu et al. (U.S. 5,318,927) (of record) is cited as evidence to show that the reduction potential is a well-known characteristic of the oxidizing agent in a polishing process.

Art Unit: 2822

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2822

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

December 15, 2004

*Maria Guerrero*  
MARIA F. GUERRERO  
PRIMARY EXAMINER